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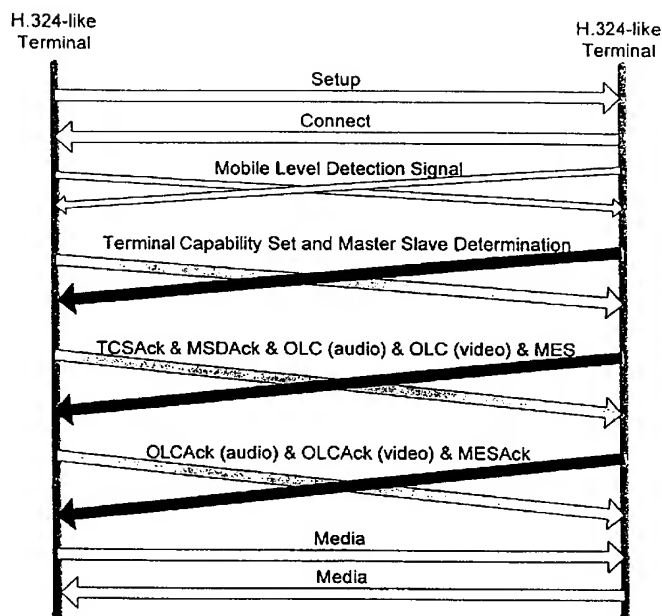
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(54) Title: METHODS AND SYSTEM FOR FAST SESSION ESTABLISHMENT BETWEEN EQUIPMENT USING H.324 AND RELATED TELECOMMUNICATIONS PROTOCOLS



(57) Abstract: Methods of establishing multimedia telecommunication (a multimedia "call") between equipment ("terminals"). More particularly, the invention provides methods for reducing the time required to establish calls between terminals that implement the ITU-T H.324 Recommendation and other Standards and Recommendations derived from or related to this such as the 3G-324M recommendation developed and adopted by the Third Generation Partnership Projects (3GPP and 3GPP2). More specifically, it relates to (i) a method and apparatus for concatenating the H.245 messages that are required to pass between the terminals at the start of the call to establish the capabilities of both terminals and agree on the type and format of media and data to be exchanged (ii) a method and apparatus for using non-standard H.245 messages or standard H.245 messages with non-standard fields to accelerate such establishment and (iii) a method and apparatus of informing each terminal of the capabilities of the other and proposing the type and format of media and data to be exchanged by means of any user-defined fields that are inserted in the call signaling protocol that is used for bearer establishment prior to the start of the H.324 stage of the call.

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# **METHODS AND SYSTEM FOR FAST SESSION ESTABLISHMENT BETWEEN EQUIPMENT USING H.324 AND RELATED TELECOMMUNICATIONS PROTOCOLS**

## **CROSS-REFERENCES TO RELATED APPLICATIONS**

This application claims priority to U.S. Provisional No. 60/433252 filed December 12, 2002, which is incorporated by reference herein.

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## **BACKGROUND OF THE INVENTION**

The present invention relates generally to methods of establishing multimedia telecommunication (a multimedia "call") between equipment ("terminals"). More particularly, the invention provides methods for reducing the time required to establish calls between terminals that implement the ITU-T H.324 Recommendation and other Standards and Recommendations derived from or related to this such as the 3G-324M recommendation developed and adopted by the Third Generation Partnership Projects (3GPP and 3GPP2). Merely by way of example, the invention has been applied to the establishment of multimedia telecommunication between 3G-324M (H.324M based protocol) multimedia handsets on a mobile telecommunications network, and between 3G-324M multimedia handsets and H.323 based terminals on a packet network using a Multimedia Gateway to mediate between the protocols used at each endpoint, but it would be recognized that the invention may also include other applications.

H.324 is an International Telecommunication Union (ITU) protocol standard for multimedia communication over general switched networks (GSTN). H.324M is an extension of H.324 for operations over mobile networks, and 3G-324M is a recommendation by the third generation partnership program (3GPP) defining adaptation of H.324M for use within 3GPP and also adopted by 3GPP2. We call H.324-like equipment devices and systems employing protocol based or derived from H.324. H.324-like equipment can connect to other H.324-like equipment via switching centers and to other non-H.324-like equipment through multimedia gateways. An example of a non-H.324-like equipment is an H.323 equipment. H.323 is an International Telecommunication Union protocol Standard for multimedia communication over non-

guaranteed bandwidth packet networks. An H.323-like equipment is an equipment that employs a protocol based or derived from the H.323 protocol.

Without any loss of generality, we will use the term "H.324" to indicate H.324-like equipment including H.324M and 3G-324M equipment and "H.323" to indicate  
5 H.323-like equipment.

Also without any loss of generality we use the term "equipment" to indicate either a user end equipment such as a handset, or network end equipment such as a switch or gateway. We also use the terms "equipment" and "terminal" interchangeably, and they both indicate the same meaning in the present document.

10 If a call is made between equipments which are an embodiment of the H.324, H.324M or 3G-324M, the first stage of the call is to establish an end-to-end bearer between the equipments. This stage is called Call Signaling and is outside the scope of H.324, except where modems and the General Switched Telephony Network are used. The second stage of the call is to establish the H.324 session, to provide a means of  
15 transporting video, audio and data between the equipments in a format that is known to, and supported by the equipments. In order to do this H.324M makes use of two further ITU-T Recommendations.

The first of these Recommendations used is H.223 "Multiplexing protocol for low bit rate multimedia communication". H.223 specifies a frame-oriented multiplexing  
20 protocol which allows the transfer of any combination of digital voice, video and data (e.g. command and control) information over a single communication link. The H.223 may have a number of modes of operation, specified in Annexes A, B and C of the H.223 Recommendation that are intended to provide increased resilience in the presence of errors. These are also known as Mobile Levels 1, 2 and 3. H.223 without the application  
25 of any of these Annexes is also sometimes referred to as operating at Mobile Level 0 (base-line). H.324 has the concept of Logical Channels which is a way of providing virtual channels over the circuit switched link. The role of the multiplexer is to combine (multiplex) parts of the data chunks written on the logical channels into frames known as a Multiplexer Protocol Data Unit (MUX-PDU). Logical Channel 0 is always available  
30 and is used for Command and Control. Data (voice, video, command and control and other general data) is passed to/from the H.223 multiplexer through bitstream chunks called service data units (SDUs). Before being multiplexed, these different SDUs go through Adaptation Layers where extra information may be added for purposes such as error detection, sequence numbering and retransmission requests.

The second of these Recommendations is H.245 "Control protocol for multimedia communication" which specifies the syntax and semantics of terminal information messages as well as procedures to use them for in-band negotiation at the start of or during communication. The messages cover receiving and transmitting capabilities and preferences, logical channel signaling and control and indication. The messages that are specified in H.245 are expressed in the ITU-T Abstract Syntax Notation (ASN.1) and can be classified as of Request, Response, Command or Indication type. H.245 messages are encoded according to the ASN.1 standard before being transmitted. When a terminal sends an H.245 message of type Request it requires that an appropriate message of type Response is sent by the remote terminal. If the Response (sometimes referred to as an Ack for Acknowledgement) is not received within a certain time, the sending terminal will re-transmit the Request or take another appropriate action if no response has been received for repeated Requests. Re-transmission of requests may occur a number of times. Many of the H.245 messages associated with call setup are of the Request type.

H.245 also requires a reliable link layer for proper operation. The principal means of providing this, specified in Annex A of H.324, is to use the Simple Retransmission Protocol (SRP) or the Numbered Simple Retransmission Protocol (NSRP), in which one or more H.245 messages, known collectively as a MultimediaSystemControl PDU and in the present document as an H.245 PDU, are formed into SRP Command Frames prior to sending, and the receiving terminal must send an SRP Response Frame (Sometimes referred to as an SRP Ack) to acknowledge correct receipt of an SRP Command Frame. No further H.245 messages may be sent by a terminal until the SRP Ack for the last message has been received.

The combined effect of the requirement to send an H.245 Response message for each H.245 Request Message received, and of the need to receive an SRP Ack for every SRP Command Frame sent means that a single H.245 Request message may take some time to be conveyed successfully. The communication involved in sending an H.245 Request message from one terminal (A) to another (B), and getting an H.245 Response (Ack) message back is shown in Figure 1A, which also shows the SRP Command Frames (SRP CF) and SRP Response Frames (SRP RF or SRP Ack) involved when single H.245 messages are formed into single SRP Command Frames. The H.324 standard allows for multiple H.245 messages to be concatenated into a single SRP Command Frame; however this capability is often not implemented, in which case such terminals may respond only to the first H.245 message encountered in an SRP Command Frame. In some cases,

terminals which do not support this capability may malfunction upon receipt of an SDU containing multiple H.245 requests or responses.

We will refer to the sequence of H.245 Request and Response shown in Figure 1A as a “round trip” and the time associated with completing it as a “round trip delay”.

5 The key steps involved in setting up and connecting a typical H.324 call are as follows:

1. Call signaling (bearer establishment) – outside the scope of H.324. Normally a modem connection if GSTN, through ISDN, or signaling through mobile switching centers in the mobile case.
- 10 2. Mobile level detection (MLD) – Where a common Mobile Level is agreed on between equipments. This step is performed by H.324 equipment that supports mobile extensions such as H.324M and 3G-324M equipment.
3. Terminal Capability Exchange (TCS) – H.245 Messaging
4. Master Slave determination (MSD) – H.245 Messaging
- 15 5. Open / Close Logical Channels (OLC) – H.245 Messaging
6. Multiplexer Table Entries Exchange (MTE) – H.245 Messaging

Steps (3) to (6) are performed using a sequence of H.245 Request and Response messages as described above and illustrated in Figure 1A. The full sequence of Request and Response messages involved in an H.324 call is shown in Figure 1B. Note the order of steps (5) and (6) above can be interchanged. It should be noted that Steps (3) to (6) relate to procedures that are defined by underlying state machines that are also known as Signaling Entities. The relevant signaling entities are:

1. Capability Exchange Signaling Entity (CESE)
2. Master Slave Determination Signaling Entity (MSDSE)
- 25 3. Logical Channel Signaling Entity (LCSE)
4. Multiplex Table Signaling Entity (MTSE)

Once these steps have completed, media (video, audio and data) can flow between the terminals. Note the H.245 messages flow on the Logical Channel 0 which as previously described is predefined and carried by the means of the multiplexer predefined Multiplex Table Entry 0. Once other Multiplex Table Entries have been exchanged these can also be used in conjunction with H.245 messages.

The key steps above are often handled sequentially; however this results in as many as ten H.245 message round trip delays in order to establish an H.324 session with two logical channels in each direction. In addition, the SRP scheme (or Numbered version – NSRP, in cases where the mobile level is greater than zero) used for

H.324/H.245, which requires an SRP message to be received by the endpoint for every message sent, prior to sending any other message, regardless of whether it is associated with the same Signaling Entity or not, further limits the scope to pipeline messages on the network, making call setup slower than if this were not the case. SRP messages are not  
5 shown in Figure 1B.

For H.324M, the Terminal Capabilities Set request (TCS) step described above and shown in Figure 1B is preceded by a mobile level detection / multiplexer synchronization phase. This consists of each terminal transmitting a repeating pattern of bits (flags) that indicate the highest Mobile Level that it operates at. Each terminal  
10 examines the flags that it is receiving. If these flags represent a lower Mobile Level then the terminal drops down to the same lower level. When both terminals are transmitting the same flag sequence this step completes.

Arising from the set of procedures described above that are required to take place to establish an H.324M call, when a call is made from a terminal which is an embodiment  
15 of the H.324 it is prone to suffer from long call setup time, which is the interval between the time that the call signaling is initiated to the time that the exchange of voice and video commences between an H324-like end-point (H.324, H.324M or 3G-324M) and other terminals whether H.324-like or not.

The ITU Recommendation H.323 uses H.245 in a similar manner to H.324 for  
20 signaling command, control and indication messages related to a call. Unlike H.324, H.323 is equipped with a number of features to speed up the call setup time between H.323 equipment. Similar techniques exist for the IETF Session Initiation Protocol (SIP) protocol.

Thus there exists a need for techniques to speed up the call setup between H.324  
25 like terminals and other terminals either of the H.324 type directly, or terminals such as H.323 via multimedia gateways. The differences between the H.324 protocol (and its extensions such as H.324M and 3G-324M) and H.323 and other protocols mean that additional aspects need to be considered when introducing call establishment speed-up techniques for H.324-like terminals. Such differences include the information about  
30 mobile levels where they are used and the messaging and information related to the H.223 multiplexer such as its multiplex table entries, adaptation layers and so on.

### BRIEF SUMMARY OF THE INVENTION

According to the present invention, techniques for telecommunications are provided. More particularly, the invention provides methods for reducing the time  
35 required to establish calls between terminals that implement the ITU-T H.324

Recommendation and other Standards and Recommendations derived from or related to this such as the 3G-324M recommendation developed and adopted by the Third Generation Partnership Projects (3GPP and 3GPP2). More specifically, it relates to (i) a method and apparatus for concatenating the H.245 messages that are required to pass  
5 between the terminals at the start of the call to establish the capabilities of both terminals and agree on the type and format of media and data to be exchanged (ii) a method and apparatus for using non-standard H.245 messages, or standard H.245 messages with non-standard fields to accelerate such establishment and (iii) a method and apparatus for informing each terminal of the capabilities of the other and proposing the type and format  
10 of media and data to be exchanged by means of any user-defined fields that are available in the call signaling protocol that is used for bearer establishment prior to the start of the H.324 stage of the call.

These methods may be used separately or severally to reduce the time that is taken from the point when a user requests the establishment of a call to the point where  
15 media starts to be exchanged between the terminals. Merely by way of example, the invention has been applied to the establishment of multimedia telecommunication between 3G-324M (H.324M based protocol) multimedia handsets on a mobile telecommunications network, and between 3G-324M multimedia handsets and H.323 based terminals on a packet network using a Multimedia Gateway to mediate between the  
20 protocols used at each endpoint, but it would be recognized that the invention may also include other applications.

According to the present invention, techniques for reducing the number of sequential steps that are required to establish an H.324-like call are provided through a number of methods that may be used separately or severally.

25 At least three types of methods are described to reduce the number of steps. We call these methods Type I, II, and III, and we number them for ease of reference in the present document. Such methods may be combined or used with conventional techniques depending upon the embodiment. One of ordinary skill in the art would recognize many variations, alternatives, and modifications.

30 In a specific embodiment, the methods are as follows:

1. Type I: Concatenation of H.245 messages so the number of standard SRP/NSRP command messages is reduced, in order to start media communication.
2. Type II: Incorporation of H.245 Non-Standard messaging capabilities to  
35 incorporate information about the equipment involved in the call so the

number of H.245 and SRP/NSRP message exchanges are minimized, in order to start media communication.

3. Type III: Incorporation of equipment preferences information in the call signaling protocol exchange as to eliminate the need for further information exchange between the equipment in order to start media communication following call signaling.

In each case the method provides a means to revert to the behavior of a terminal conforming with the H.324 standard.

Type I: Speed-up by Concatenation of H.245 Messages in SRP/NSRP Command

Frames

This method exploits the capability to concatenate multiple H.245 messages within a single SRP/NSRP (H.245 PDU) Command Frame as a mean to reduce the number of H.245, SRP/NSRP messages and associated round-trip delays. The H.245 messages have to be concatenated in a way as not to violate dependencies.

The usage of H.245 within H.324 allows equipment to concatenate multiple H.245 elements into a single PDU, thus avoiding the need to use two round trips for each request/response pair due to the need for an SRP/NSRP response to be received for each H.245 PDU before the next PDU is allowed be transmitted.

The method uses concatenated H.245 to send multiple H.245 messages, each originating from different Signaling Entities that have no dependencies on each other, within a single H.245 PDU.

Interoperability with equipment that do not support concatenated H.245 is achieved by noting that such equipment ignore the second and subsequent H.245 elements in a PDU, so will not send any required H.245 Response messages if the ignored message is an H.245 Request message. Therefore the first concatenated H.245 PDU sent should contain at least two Request messages, where the first message must be a Request. If only the Ack for the first message is received, the sending equipment will retransmit those Requests and any other messages that have not been acknowledged, and in doing this and in sending any and all subsequent H.245 messages should revert to sending only a single H.245 message in each subsequent H.245 PDU. If responses to all H.245 messages in the first H.245 PDU are received, the sending equipment can continue to use concatenated messages. The use of this technique will reduce the number of round trip delays if concatenated messages are supported. This method does not define any protocol elements additional to those already allowed and defined by the H.245 and H.324 standards. It can



be considered to be utilizing the existing protocols in a smart fashion, rather than an extension to it.

Preferably, the present invention provides a method of initiating a call between users with reduced call set-up times using one or more telecommunication networks. The method is provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks. The method includes transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call, establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal, and determining a common mobile level. Additionally, the method includes determining two or more H.245 messages associated with set up parameters for an initial predetermined mode of operation, concatenating the two or more H.245 messages into one SRP command frame according to a predetermined size of the SRP command frame, and transmitting the SRP command frame including the two or more H.245 messages from the first terminal to the second terminal through a telecommunication network. Moreover, the method includes transmitting an SRP acknowledge message by the second terminal once the SRP command frame has been received by the second terminal, processing at least the two or more H.245 messages during a predetermined time period, and establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel.

According to another embodiment, the present invention provides a computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks. The computer-readable medium is provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks. The computer-readable medium includes one or more instructions for transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call, one or more instructions for establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal, and one or more instructions for determining a common mobile level. Additionally, the computer-readable medium includes one or more instructions for determining two or more H.245 messages associated with set up parameters for an initial predetermined mode of operation, one or more instructions for concatenating the two or more H.245 messages into one SRP command frame according to a predetermined size of the SRP command frame, and one or more instructions for transmitting the SRP command frame including the two or more

H.245 messages from the first terminal to the second terminal through a telecommunication network. Moreover, the computer-readable medium includes one or more instructions for transmitting an SRP acknowledge message by the second terminal once the SRP command frame has been received by the second terminal, one or more  
5 instructions for processing at least the two or more H.245 messages during a predetermined time period, and one or more instructions for establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel.

Type II: Speed-up using H.245 Non-Standard Messages

10 A second method that is the subject of the present invention for reducing the number of sequential steps that are required to establish an H.324-like call proposes the use of Non-Standard messaging capabilities of the H.245 protocol. H.245 allows a number of ways of adding non-standard extensions. There are a number of ways to add non-standard messages in H.245 in order to speed up the call. The most interesting of  
15 these is the use of a nonstandard Capability within the H.245 TerminalCapabilitySet message and a NonStandardMessage H.245 Response message. These messages can be used to signal that the calling equipment is capable of operating in a particular way, and to provide proposals and preferences to the remote terminal relating to Master Slave Determination, Logical Channel(s) to be opened and Multiplexer Table Entries embedded  
20 within these non-standard extensions to accelerate call set-up. If the remote terminal supports this method, it will signal the calling terminal using a non-standard extension which will also indicate that it accepts, and may also propose modifications or provide other information, including for example the Multiplexer Table Entries that it is using.

If the called terminal does not support this method, it will simply ignore the non-  
25 standard extension and not respond with the non-standard response, but a standard response. The call will then proceed as for a standard H.324-like call. The Type II method does not require non-supporting terminals to handle Type I method.

Preferably, the invention provides a method of initiating a call between users with reduced call set-up times using one or more telecommunication networks. The  
30 method includes transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call and establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal. The method also includes determining a common mobile level for operation. The method provides one or more  
35 custom Non-Standard H.245 messages or custom Non-Standard fields in standard

messages. The one or more custom H.245 messages or custom Non-Standard fields are associated with one or more set up parameters for an initial predetermined mode of operation. Additionally, the method includes transmitting the one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages from the first terminal to the second terminal, transmitting a custom Non-Standard response message associated with the one or more custom Non-Standard H.245 messages or custom Non-Standard fields from the second terminal to the first terminal, and processing the one or more custom H.245 messages or custom Non-Standard fields during a predetermined time period. Moreover, the method includes establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel based upon at least one or more of the custom H.245 messages or custom Non-Standard fields.

According to another embodiment, the present invention provides a computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks. The computer-readable medium is provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks. The computer-readable medium includes one or more instructions for transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call, one or more instructions for establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal, and one or more instructions for determining a common mobile level for operation. Additionally, the computer-readable medium includes one or more instructions for providing one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages. The one or more custom H.245 messages or custom Non-Standard fields are associated with one or more set up parameters for an initial predetermined mode of operation. Moreover, the computer-readable medium includes one or more instructions for transmitting the one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages from the first terminal to the second terminal, one or more instructions for transmitting a custom Non-Standard response message associated with the one or more custom Non-Standard H.245 messages or custom Non-Standard fields from the second terminal to the first terminal, and one or more instructions for processing the one or more custom H.245 messages or custom Non-Standard fields during a predetermined time period. Also, the computer-readable medium includes one or more instructions for establishing the initial predetermined mode of operation between the first

terminal and the second terminal through the bearer channel based upon at least one or more of the custom H.245 messages or custom Non-Standard fields.

Type III: Speed-up by Incorporation of Equipment Preferences in Call Signaling Phase

5           A third method for reducing call set up times for H.324 terminals proposes passing information during the call signaling phase (bearer establishment) where it is possible to embed user-defined information into the bearer establishment protocol. This method allows an H.324-like calling equipment to specify equipment preferences in terms of media communication and the underlying configurations for the multiplexer and the  
10           logical channels. There are a number of ways to represent such preferences including preference codes (numeric or alpha-numeric string representing pre-defined preference configuration) and explicit preferences expressed in a format such as the ITU-T Abstract Syntax Notation (ASN.1) format. We call these preferences (coded or explicit) profiles. In the case of explicit preferences or profile, a list of profiles can be transmitted as part of  
15           the bearer setup signal or message. A profile (coded or explicit) specifies exact values for the all aspects of the multiplexer and H.245 channels necessary to set up a call. For example, the Mobile Level, Master Slave Determination, media formats for each logical channel and the multiplexer table entries for each logical channel must be defined. The answering equipment then selects the profiles to use in user-defined information  
20           embedded in the bearer establishment (call signaling) signal or message. This allows the terminals to exchange the parameters of the H.245 channel at the time the called equipment accepts the call, rather than requiring multiple round trips after the call is accepted.

          The bearer establishment (call signaling) is typically specific to the network  
25           where the H.324-like equipment is being used. In the context of 3G-324M, the call signaling uses an ITU-T Q.931-like call signaling protocol that allows the incorporation of the preference information messages. The Q.931 allows for the incorporation of user-defined information in the protocol messages. Q.931 signaling can be complex, but for the purpose of our description here it can be simplified to two messages. A “Setup”  
30           Q.931 message containing the calling party information and other parameter is transmitted from the calling equipment to the called terminal. The called terminal will respond with a “Connect” message to answer the call (e.g. user pressed the answer button). In this context the H.324-like equipment preferences are incorporated in the “Setup” message transmitted by the calling equipment. As mentioned earlier the  
35           preference messages can be incorporated in the user defined part of the Q.931 message.

When the called terminal answers the call by transmitting the "Connect" Q.931 message, it incorporates its preferred mode of operation in the user defined field of its "Connect" response message. The Setup and Connect messages are described further in the ITU-T Q.931 Recommendation and in the 3GPP technical specification documents. Note that  
5 the 3GPP2 equivalent documents exist for the CDMA counterpart of the WCDMA 3GPP.

In the case of ISDN networks (e.g. H.324 over ISDN) and networks signaled using SS7 protocols, a configuration similar to that described above for 3GPP can be used.

In the case of GSTN networks, the call signaling protocols such as V.8, and  
10 V.8bis can be augmented to incorporate III preference codes.

Ability to utilize coded or explicit preferences overcome some limitations that call signaling protocols may have on the amount of user-defined information that can be included in their messages or signals.

Preferably, the present invention provides a method of initiating a call between  
15 users with reduced call set-up times using one or more telecommunication networks. The method includes providing one or more preferences for a call associated with a first terminal (e.g., handset, gateway, and other equipment) and a second terminal (e.g., handset, gateway, and other equipment). The one or more preferences are associated with an initial mode of operation for the call between the first terminal and the second  
20 terminal. The method also includes processing the one or more preferences as a Custom Message (e.g., user defined based upon preferences) and embedding the Custom Message in a predetermined field of a call initiation message. The method transfers the Custom Message from the first terminal to the second terminal through a telecommunication network using call signaling and processes the Custom Message by the second terminal.  
25 The method includes transferring a Custom Response Message by the second terminal using a call signaling response message to indicate to the first terminal the initial mode of operation and exchanging information between the first terminal and the second terminal after the initial mode of operation has been established.

Note that this method of incorporating equipment preference modes of operation  
30 in the call signaling is particularly efficacious when used in conjunction with H.323 fast connect in the context of an H.324/H.323 gateway that mediates calls between H.324-like and H.323-like equipment, respectively. It is similarly efficacious when used in the context of an H.324/SIP gateway that mediates calls between H.324-like and SIP equipment.

According to another embodiment, the present invention provides a computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks. The computer-readable medium is provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks. The computer-readable medium includes one or more instructions for providing one or more preferences for a call associated with a first terminal and a second terminal. The one or more preferences are associated with an initial mode of operation for the call between the first terminal and the second terminal. Additionally, the computer-readable medium includes one or more instructions for processing the one or more preferences as a Custom Message, one or more instructions for embedding the Custom Message in a predetermined field of a call initiation message, and one or more instructions for transferring the Custom Message from the first terminal to the second terminal through a telecommunication network using call signaling. Moreover, the computer-readable medium includes one or more instructions for processing the Custom Message by the second terminal, one or more instructions for transferring a Custom Response Message by the second terminal using a call signaling response message to indicate to the first terminal the initial mode of operation, and

one or more instructions for exchanging information between the first terminal and the second terminal after the initial mode of operation has been established.

The objects, features, and advantages of the present invention, which to the best of our knowledge are novel, are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages, may best be understood by reference to the following description, taken in connection with the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1A is a diagram useful in illustrating the communications that flow between two H.324 terminals when an H.245 Request message is sent from one terminal to the other;

FIG 1B illustrates session Set-up for a call between H.324-like equipment. Note in this case unidirectional video channels are used (e.g. video over adaptation layer AL2 of the H.223 multiplexer).

FIG 2 illustrates an embodiment of the method of using concatenated H.245 between two H.324 terminals to reduce connection times for H.324 calls;

FIG. 3 illustrates an embodiment of the method of using non-standard extensions of H.245 messages to reduce connection times for H.324 calls;

FIG 4 illustrates an embodiment of the method of using bearer “user” information to reduce connection times for H.324 calls;

FIG. 5 illustrates an embodiment of the method of using bearer “user” information to reduce connection times for calls between an H.324 terminal and an H.323  
5 terminal using a gateway;

FIG. 6 illustrates an embodiment of the ASN.1 Syntax description for Type II Request;

FIG. 7 illustrates an embodiment of the ASN.1 Syntax description for Type II Response;

10 FIG. 8 illustrates an embodiment of the ASN.1 Syntax description for Type III Request;

FIG. 9 illustrates an embodiment of the ASN.1 Syntax description for Type III Response;

15 FIG. 10 illustrates an embodiment of some coded Profiles, and their description, that can be used in Type III Request and Response.

#### **DETAILED DESCRIPTION OF THE INVENTION**

According to the present invention, techniques for telecommunications are provided. More particularly, the invention provides methods for reducing the time required to establish calls between terminals that implement the ITU-T H.324  
20 Recommendation and other Standards and Recommendations derived from or related to this such as the 3G-324M recommendation developed and adopted by the Third Generation Partnership Projects (3GPP and 3GPP2). More specifically, it relates to (i) a method and apparatus for concatenating the H.245 messages that are required to pass between the terminals at the start of the call to establish the capabilities of both terminals  
25 and agree on the type and format of media and data to be exchanged (ii) a method and apparatus for using non-standard H.245 messages to accelerate such establishment and (iii) a method and apparatus of informing each terminal of the capabilities of the other and proposing the type and format of media and data to be exchanged by means of any user-defined fields that are inserted in the call signaling protocol that is used for bearer  
30 establishment prior to the start of the H.324 stage of the call. These methods may be used separately or severally to reduce the time that is taken from the point when a user requests the establishment of a call to the point where media starts to be exchanged between the terminals. Merely by way of example, the invention has been applied to the establishment of multimedia telecommunication between 3G-324M (H.324M based  
35 protocol) multimedia handsets on a mobile telecommunications network, and between

3G-324M multimedia handsets and H.323 based terminals on a packet network using a Multimedia Gateway to mediate between the protocols used at each endpoint, but it would be recognized that the invention may also include other applications.

The methods described above are generic and can be implemented in many different ways by a person skilled with the field. We describe below example embodiments to illustrate the methods which can be adapted easily to suite specific equipment needs.

Type I Example Embodiment:

In a particular embodiment of this method of concatenated H.245 messages a terminal combines H.245 Request Terminal Capabilities (TCS) and Request Master Slave Determination (MSD) messages into a single H.245 PDU. It also concatenates TCS and MSD Response Messages (Acks), multiple Open Logical Channel Requests (OLC) and Multiplex Table Entry Send Request (MES) in a single H.245 PDU. Finally it combines OLC and MES responses into a third H.245 PDU. The process of setting up an H.324 call between two terminals which support this embodiment of the concatenation method is illustrated in Figure 2. The result of adopting this approach reduces the number of round trips required for call setup from around ten to three. This embodiment requires that the MSDSE and CESE state machines can run in parallel, and that the multiple LCSE and MTSE state machines can run in parallel. This embodiment is merely one example of the application of the method of concatenated H.245 messages in the present invention; other concatenations of messages can be constructed; these may put different constraints on the signaling entity state machines within the implementation of H.245.

Optionally, the method also includes reverting to a normal operation if one of the terminals does not support Type I (i.e. concatenated H.245 messages). The calling terminal in this case detects that because it would not have received the H.245 response to the second of the concatenated H.245 messages. In this case the calling terminal would revert to individual H.245 messages in the SRP command frames and retransmit the H.245 messages individually from the second message onwards . There can be many other variations, alternatives, and modifications.

Alternatively, the method can also be applied to the Numbered Simple Retransmission Protocol (numbered version of SRP which includes a sequence number in the SRP command and SRP acknowledgement frames) and other like variations. Of course, there can be other variations, modifications, and alternatives.

Type II Example Embodiment:



In a particular embodiment of the method of using custom H.245 messages, a non-standard Capability is used. An H.324-like equipment requires that the first H.245 message it sends is a Terminal Capability Set (TCS) message. The calling equipment includes a capability of type NonStandardParameter in the TCS it sends to the answering  
5 equipment. This capability is identified by a NonStandardIdentifier with a unique Object Identifier. This capability contains the additional parameters needed by the called terminal to start the call, including terminalType (needed for MSD in the same manner as it is required for standard H.245 operation) and Multiple Table Entry (MTE) Descriptors. Figure 6 shows an example of an ASN.1 description containing the syntax for all of these  
10 data. By including this NonStandard Capability, the calling party is required to accept the decision of the called party as to whether this method is used, and what channels are selected.

If the called equipment does not support this method the calling equipment receives a conventional TCSAck and normal H.245 negotiation is then used to continue  
15 the call set-up.

If a called terminal receives a TCS containing the NonStandard capability relating to this method and itself supports the method, it will perform a master slave determination by comparing the terminalType value in the received NonStandard capability with the value for the local terminal. The highest value will be selected as the  
20 master. In the event of equal terminal type values, the calling terminal will be selected as the master.

The called terminal will analyze the received capability table to determine the OpenLogicalChannel and multiplex table entries for the new connection. The called terminal will respond with a normal TCSAck if it cannot derive an acceptable channel  
25 configuration, or if it is unable to accept the multiplexEntryDescriptors provided. The remainder of the call set-up will then be via normal H.245 negotiation.

If acceptable channel configurations and multiplex table entries can be derived, the called party will replace the normal TCSAck with an H.245 ResponseMessage of the type NonStandardMessage. See Figure 7 for an ASN.1 Syntax description of the encoded  
30 data. The NonStandardIdentifier of the non-standard response message will have the same Object Identifier as the NonStandard capability which identifies this method.

Note that the called terminal does not include any additional or NonStandard capabilities into the TCS it sends to the calling terminal, even if it supports this method. The calling terminal must wait to receive either a TCSAck or the NonStandardMessage  
35 before proceeding.

The process of setting up an H.324 call between two terminals which support this embodiment of the method of using custom H.245 messages is illustrated in Figure 3. This embodiment offers one and a half less round trip exchanges than the embodiment of the method of Concatenated H.245.

5           Capability expressed in the TerminalCapabilitySet request message. This ensures that the called terminal would not malfunction or hang-up as it is required to be able to handle the case of a non-standard Capability being communicated to it.

The second key aspect is that the encapsulation of the custom message in the TerminalCapabilitySet request message allows the terminal to transmit the custom  
10       message in the first H.245 message after the mobile level determination is done, and hence it does not have to wait.

The third aspect is that the TerminalCapabilitySet request containing the Type II message embedded as a non-standard Capability can be transmitted using the Type I mode (together with one or more H.245 messages).

15           The fourth aspect is that the called terminal responds with an Ack message that informs the calling terminal of the preferred modes of the called terminal and its selection of one of the preferred modes of the calling terminal if the calling terminal presented several preferences in its Type II message.

Type III Example Embodiment:

20           In a particular embodiment of the method of using call signaling "user" information, Q.931 User-User Information Element is used in the SETUP and CONNECT PDUs. This Information Element is filled with an ASN.1 encoded structure (See Figure 8) including terminalType (needed for MSD in the same manner as it is required for standard H.245 operation) and a list of profiles the calling terminal wishes to offer. By  
25       including this Information Element, the calling party is required to accept the decision of the called party as to whether this method is used, and what profile is selected.

Each profile dictates the Mobile Level, Multiplex Table Entries, Logical Channels used and codecs used for each Logical Channel. Figure 10 illustrates some examples of profiles. The profile contains all the information required to immediately  
30       begin a call and establish media between the terminals without the need to go through further H.245 signaling after the bearer is set up.

If the called terminal does not support this method, the calling terminal receives a Q.931 CONNECT PDU without a User-User Information Element and normal call set-up is then used.

If a called terminal receives a SETUP PDU containing the User-User Information Element relating to this method and itself supports the method, it will perform a master slave determination by comparing the terminalType value in the received Information Element with the value for the local terminal. The highest value  
5 will be selected as the master. In the event of equal terminal type values, a technique such as selecting the calling terminal as the master can be used to resolve the conflict.

The called terminal will also select one of the offered profiles. If none of the offered profiles are suitable then no User-User Information Element should be added to the Q.931 CONNECT PDU, and the call proceeds as normal.

10 If a profile is suitable then the master slave determination result and the selected profile is encoded according to the ASN.1 Syntax for the response and added to the Q.931 CONNECT PDU as a User-User Information Element. Figure 9 illustrates a particular embodiment.

The process of setting up an H.324 call between two terminals which support this  
15 embodiment of the method of using call signaling "user" information is illustrated in Figure 4.

Embodiment in the Context of a H.324/H.323 Gateway:

A further embodiment demonstrating use with a gateway to an H.323 terminal using "FastConnect" is illustrated by Figure 5. These embodiments offer a maximum  
20 reduction in call set up time. These embodiments eliminate all round trip exchange for H.245 messages and, for the H.324 call segment, initial mobile level detection.

Embodiment in the Context of a H.324/SIP Gateway:

The embodiment in this context is similar to that of the H.324/H.323 gateway with the exception that the gateway converts the information (Type I, II and/or III) to SIP  
25 signaling messages.

Additionally, any terminal may support Type III and another terminal may support Type I/II. Both terminals should be able to operate at their common support type (i.e. in this case Type II) as if the calling terminal would not receive the Type III response in the call signaling phase. The general mode is that terminals fall back to the highest  
30 common mode and within that mode to the highest supported version. Of course, there may be variations, alternatives, and modifications.

The previous description of the preferred embodiment is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic  
35 principles defined herein may be applied to other embodiments without the use of the

inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein. For example, the functionality above may be combined or further separated, depending upon the embodiment. Certain features may  
5 also be added or removed. Additionally, the particular order of the features recited is not specifically required in certain embodiments, although may be important in others. The sequence of processes can be carried out in computer code and/or hardware depending upon the embodiment. Of course, one of ordinary skill in the art would recognize many other variations, modifications, and alternatives.

10           Additionally, it is also understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application and scope of the appended claims.

**WHAT IS CLAIMED IS:**

1. A method of initiating a call between users with reduced call set-up times using one or more telecommunication networks, the method being provided  
5 between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks, the method comprising:

providing one or more preferences for a call associated with a first terminal and a second terminal, the one or more preferences being associated with an initial mode of operation for the call between the first terminal and the second terminal;

10 processing the one or more preferences as a Custom Message;

embedding the Custom Message in a predetermined field of a call initiation message;

transferring the Custom Message from the first terminal to the second terminal through a telecommunication network using call signaling;

15 processing the Custom Message by the second terminal;

transferring a Custom Response Message by the second terminal using a call signaling response message to indicate to the first terminal the initial mode of operation; and

20 exchanging information between the first terminal and the second terminal after the initial mode of operation has been established.

2. The method of claim 1 wherein the information comprises voice and video.

25 3. The method of claim 1 wherein the one or more preferences is associated with an ITU-T ASN.1 custom message.

4. The method of claim 1 wherein the one or more preferences is coded using a modulated signal.

30

5. The method of claim 1 wherein the first terminal is an H.324-like gateway.

6. The method of claim 1 wherein the second terminal is an H.324-like  
35 gateway.

7. A method of initiating a call between users with reduced call set-up times using one or more telecommunication networks, the method being provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks, the method comprising:

transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call;

establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal;

determining a common mobile level for operation;

providing one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages, the one or more custom H.245 messages or custom Non-Standard fields being associated with one or more set up parameters for an initial predetermined mode of operation;

transmitting the one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages from the first terminal to the second terminal;

transmitting a custom Non-Standard response message associated with the one or more custom Non-Standard H.245 messages or custom Non-Standard fields from the second terminal to the first terminal;

processing the one or more custom H.245 messages or custom Non-Standard fields during a predetermined time period; and

establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel based upon at least one or more of the custom H.245 messages or custom Non-Standard fields.

25

8. The method of claim 7 wherein the one or more custom Non-Standard H.245 messages are represented themselves as one or more Non-Standard Capabilities embedded in a H.245 terminal capability set request message.

9. The method of claim 7 wherein one or more user preferences, either coded or explicit, are provided in one of the custom Non-Standard H.245 messages.

10. A method of initiating a call between users with reduced call set-up times using one or more telecommunication networks, the method being provided

between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks, the method comprising:

transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call;

5 establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal;

determining a common mobile level;

determining two or more H.245 messages associated with set up parameters for an initial predetermined mode of operation;

10 concatenating the two or more H.245 messages into one SRP command frame according to a predetermined size of the SRP command frame;

transmitting the SRP command frame including the two or more H.245 messages from the first terminal to the second terminal through a telecommunication network;

15 transmitting an SRP acknowledge message by the second terminal once the SRP command frame has been received by the second terminal;

processing at least the two or more H.245 messages during a predetermined time period; and

establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel.

20

11. The method of claim 10 wherein the mobile level detection is performed according to at least one selected from the group consisting of H.324 baseline also known as mobile level 0, mobile level 1 also known as ITU-T H.223 annex A, mobile level 2 also known as ITU-T H.223 annex B, and mobile level 3 also known as ITU-T H.223  
25 annex C.

30

12. The method of claim 10 further comprising transmitting another SRP command frame including two or more H.245 messages only after the SRP acknowledge message has been received by the first terminal.

13. The method of claim 10 wherein the reduced call set up time is at least 50% relative to a standard sequential exchange of the individual H.245 messages.

14. The method of claim 10 wherein the H.245 messages includes one or more that are selected from terminal capability set request, master slave determination request, open logical channel requests, and multiplex table entry definitions requests.

5 15. The method of claim 10 wherein the first terminal is a handset and the second terminal is an equipment providing a H.324-like termination other than a handset.

16. The method of claim 10 wherein the first terminal is a handset and the second terminal is a handset.

10

17. The method of claim 10 wherein the first terminal operates as a master and the second terminal operates as a slave once a predetermined criterion has been established.

15 18. The method of claim 10 wherein the predetermined criteria is associated with a first SRP command frame.

19. The method of claim 10 further comprising exchanging voice and video information between the first terminal and the second terminal after the initial  
20 predetermined mode has been established.

20. The method of claim 10 wherein concatenated two or more messages are encoded using a common syntax.

25 21. The method of claim 20 wherein the common syntax is the ITU-T ASN.1 PER (Packed Encoding Rules).

22. The method of claim 10 further comprising operating in an alternative normal mode if the concatenated two or more messages are not processed by the second  
30 terminal.

23. A computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks, the computer-readable medium being provided between at least a pair of



H.324-like terminals coupled to the one or more telecommunication networks, the computer-readable medium comprising:

one or more instructions for providing one or more preferences for a call associated with a first terminal and a second terminal, the one or more preferences being  
5 associated with an initial mode of operation for the call between the first terminal and the second terminal;

one or more instructions for processing the one or more preferences as a Custom Message;

one or more instructions for embedding the Custom Message in a predetermined  
10 field of a call initiation message;

one or more instructions for transferring the Custom Message from the first terminal to the second terminal through a telecommunication network using call signaling;

one or more instructions for processing the Custom Message by the second  
15 terminal;

one or more instructions for transferring a Custom Response Message by the second terminal using a call signaling response message to indicate to the first terminal the initial mode of operation; and

one or more instructions for exchanging information between the first terminal  
20 and the second terminal after the initial mode of operation has been established.

24. The computer-readable medium of claim 23 wherein the information comprises voice and video.

25. The computer-readable medium of claim 23 wherein the one or more  
25 preferences is associated with an ITU-T ASN.1 custom message.

26. The computer-readable medium of claim 23 wherein the one or more  
preferences is coded using a modulated signal.

30

27. The computer-readable medium of claim 23 wherein the first terminal is an H.324-like gateway.

28. The computer-readable medium of claim 23 wherein the second  
35 terminal is an H.324-like gateway.

29. A computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks, the computer-readable medium being provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks, the computer-readable medium comprising:

one or more instructions for transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call;

one or more instructions for establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal;

one or more instructions for determining a common mobile level for operation;

one or more instructions for providing one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages, the one or more custom H.245 messages or custom Non-Standard fields being associated with one or more set up parameters for an initial predetermined mode of operation;

one or more instructions for transmitting the one or more custom Non-Standard H.245 messages or custom Non-Standard fields in standard messages from the first terminal to the second terminal;

one or more instructions for transmitting a custom Non-Standard response message associated with the one or more custom Non-Standard H.245 messages or custom Non-Standard fields from the second terminal to the first terminal;

one or more instructions for processing the one or more custom H.245 messages or custom Non-Standard fields during a predetermined time period; and

one or more instructions for establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel based upon at least one or more of the custom H.245 messages or custom Non-Standard fields.

30. The computer-readable medium of claim 29 wherein the one or more custom Non-Standard H.245 messages are represented themselves as one or more Non-Standard Capabilities embedded in a H.245 terminal capability set request message.

31. The computer-readable medium of claim 29 wherein one or more user preferences, either coded or explicit, are provided in one of the custom Non-Standard H.245 messages.

5 32. A computer-readable medium including instructions for initiating a call between users with reduced call set-up times using one or more telecommunication networks, the computer-readable medium being provided between at least a pair of H.324-like terminals coupled to the one or more telecommunication networks, the computer-readable medium comprising:

10 one or more instructions for transmitting a call signaling message from a first terminal to a second terminal through a telecommunication network to initiate a call;

one or more instructions for establishing a bearer channel between the first terminal and the second terminal once the call signaling message has been received by the second terminal;

15 one or more instructions for determining a common mobile level;

one or more instructions for determining two or more H.245 messages associated with set up parameters for an initial predetermined mode of operation;

one or more instructions for concatenating the two or more H.245 messages into one SRP command frame according to a predetermined size of the SRP command frame;

20 one or more instructions for transmitting the SRP command frame including the two or more H.245 messages from the first terminal to the second terminal through a telecommunication network;

one or more instructions for transmitting an SRP acknowledge message by the second terminal once the SRP command frame has been received by the second terminal;

25 one or more instructions for processing at least the two or more H.245 messages during a predetermined time period; and

one or more instructions for establishing the initial predetermined mode of operation between the first terminal and the second terminal through the bearer channel.

30 33. The computer-readable medium of claim 32 wherein the mobile level detection is performed according to at least one selected from the group consisting of H.324 baseline also known as mobile level 0, mobile level 1 also known as ITU-T H.223 annex A, mobile level 2 also known as ITU-T H.223 annex B, and mobile level 3 also known as ITU-T H.223 annex C.

34. The computer-readable medium of 32 further comprising transmitting another SRP command frame including two or more H.245 messages only after the SRP acknowledge message has been received by the first terminal.

5 35. The computer-readable medium of claim 32 wherein the reduced call set up time is at least 50% relative to a standard sequential exchange of the individual H.245 messages.

36. The computer-readable medium of claim 32 wherein the H.245  
10 messages includes one or more that are selected from terminal capability set request, master slave determination request, open logical channel requests, and multiplex table entry definitions requests.

37. The computer-readable medium of claim 32 wherein the first terminal is  
15 a handset and the second terminal is an equipment providing a H.324-like termination other than a handset.

38. The computer-readable medium of claim 32 wherein the first terminal is  
a handset and the second terminal is a handset.

20

39. The computer-readable medium of claim 32 wherein the first terminal operates as a master and the second terminal operates as a slave once a predetermined criterion has been established.

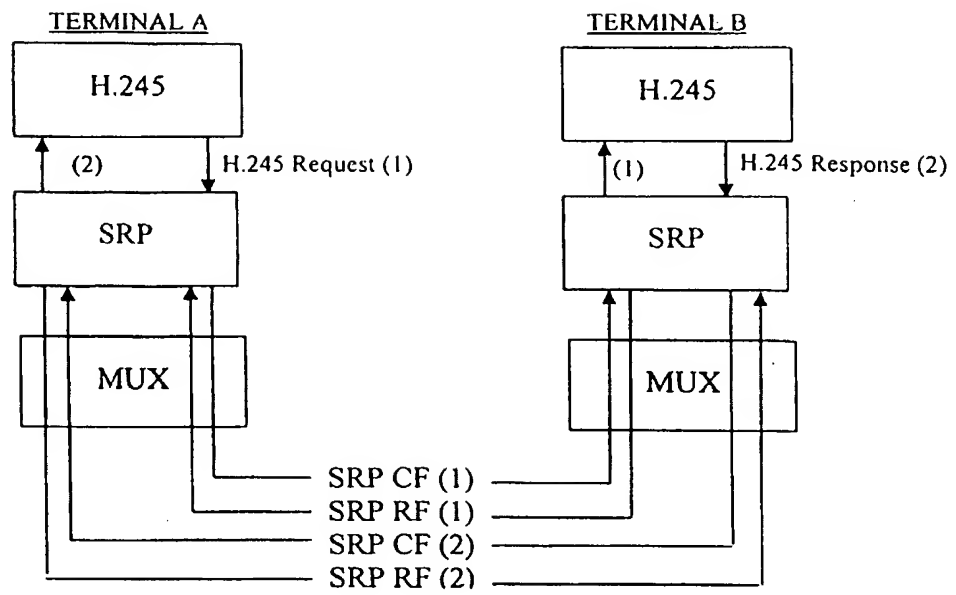
25 40. The computer-readable medium of claim 32 wherein the predetermined criteria is associated with a first SRP command frame.

41. The computer-readable medium of claim 32 further comprising  
exchanging voice and video information between the first terminal and the second  
30 terminal after the initial predetermined mode has been established.

42. The computer-readable medium of claim 32 wherein concatenated two or more messages are encoded using a common syntax.

43. The computer-readable medium of claim 42 wherein the common syntax is the ITU-T ASN.1 PER (Packed Encoding Rules).

44. The computer-readable medium of claim 32 further comprising  
5 operating in an alternative normal mode if the concatenated two or more messages are not processed by the second terminal.

**Figure 1A PRIOR ART**

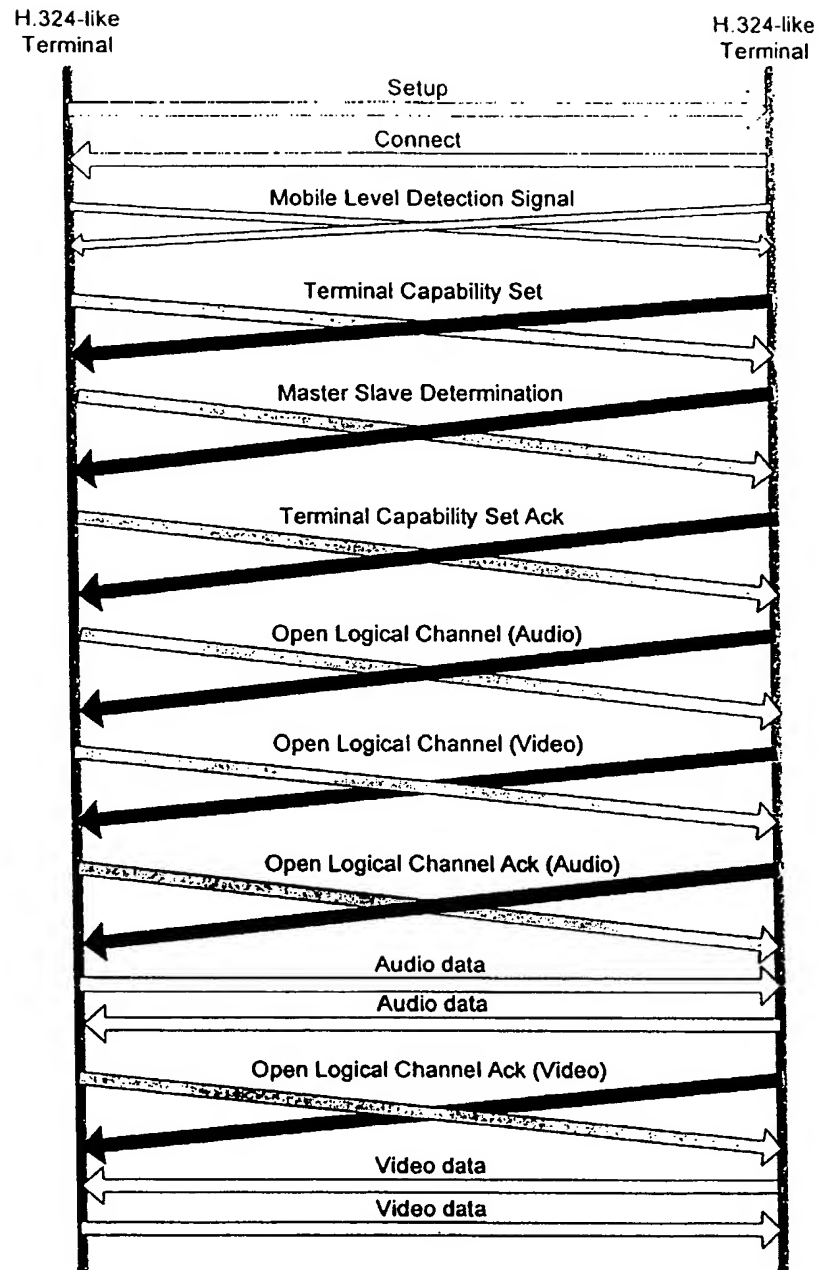


Figure 1B PRIOR ART

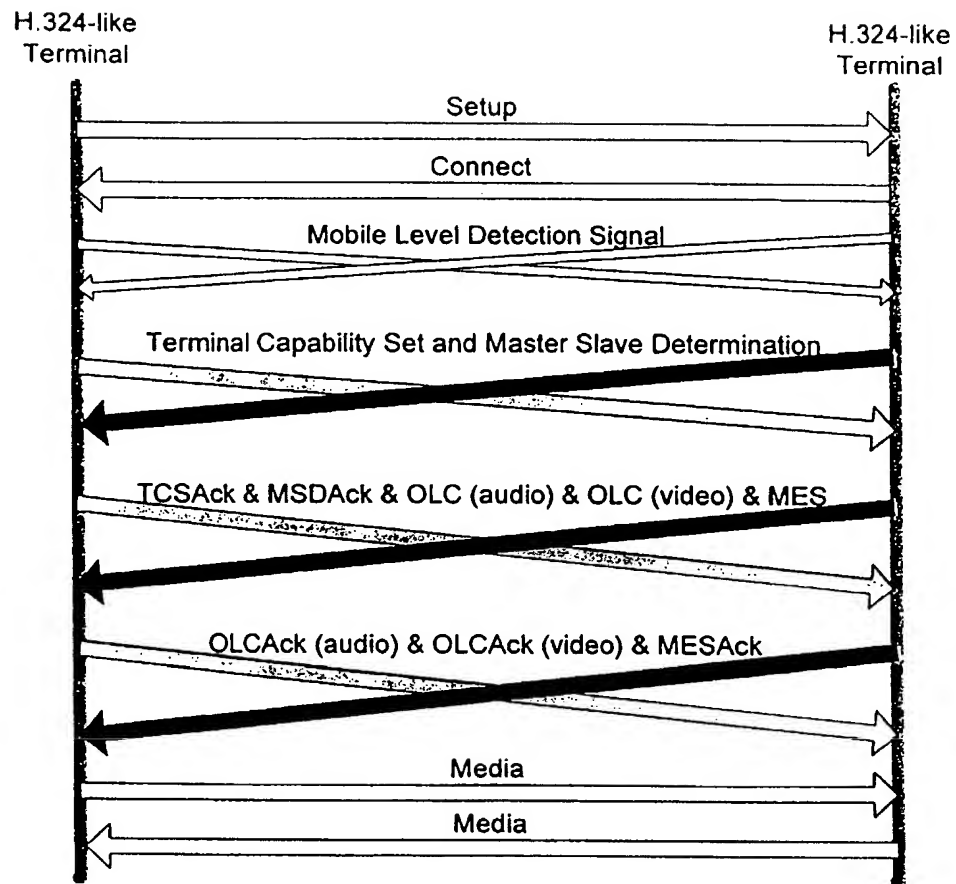


Figure 2



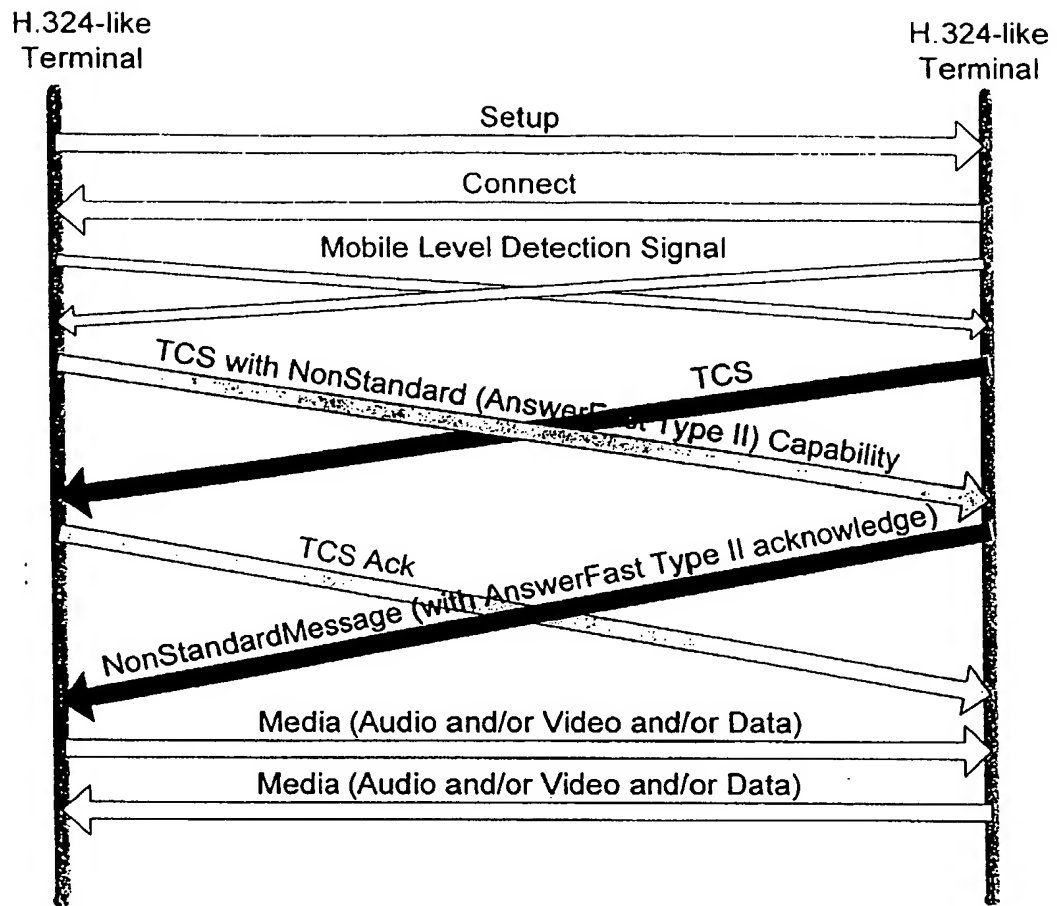


Figure 3

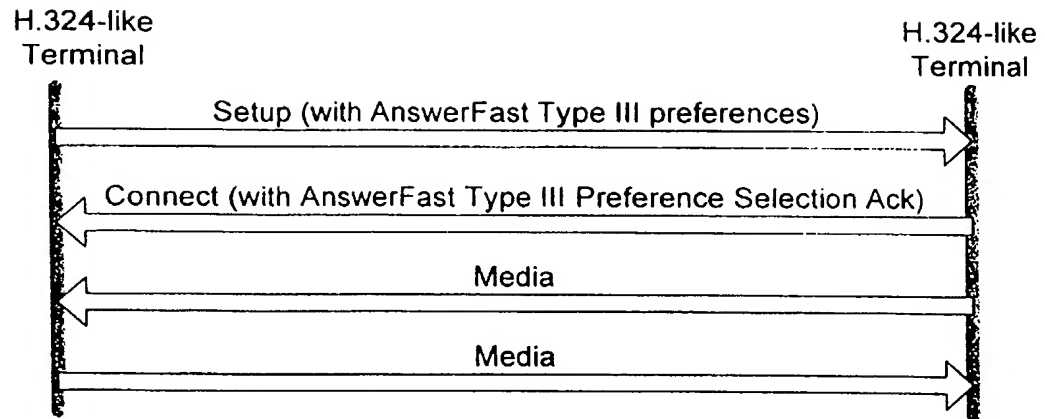
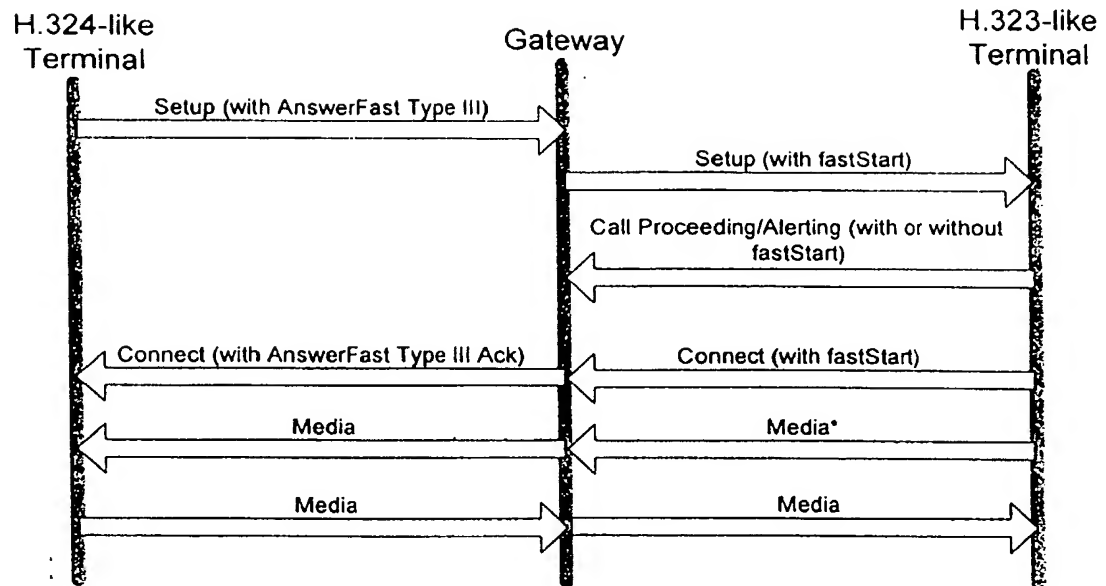


Figure 4



\* Note that if the mediaWaitForConnect is set to TRUE in the Setup message then the media is not transmitted until after the Connect message is sent.

Figure 5

.

```
|  Type2Request ::= SEQUENCE
|  {
|    version INTEGER (1..255),
|    license INTEGER (1..MAX),
|    terminalType    INTEGER (0..255), -- For MSD
|    multiplexEntryDescriptors  SET SIZE (1..15) OF
|                                MultiplexEntryDescriptor OPTIONAL, -- MTE
|    ...
|  }
|
|
|
```

**Figure 6**

```
{
  Type2Response ::= SEQUENCE
  {
    sequenceNumber SequenceNumber,

    version INTEGER (1..255),
    license INTEGER (1..MAX),

    decision CHOICE -- MSD result based on "terminalType" compare
    {
      -- if terminalType is the same then caller
      master NULL, -- is always the master
      slave NULL
    },

    multiplexTableEntryNumber SET SIZE (1..15) OF
      MultiplexTableEntryNumber OPTIONAL,

    logicalChannels SEQUENCE OF OpenLogicalChannel,

    ...
  }
}
```

Figure 7

```
Type3Setup ::= SEQUENCE
{
    version      INTEGER (1..255),
    license      INTEGER (1..MAX),
    terminalType  INTEGER (0..255), -- For MSD
    profiles     SEQUENCE (1..30) OF INTEGER (0..65535),
    mediaWaitForConnect BOOLEAN,
    ...
}
```

**Figure 8**

:

```
Type3Connect ::= SEQUENCE
{
    version INTEGER (1..255),
    license INTEGER (1..MAX),
    decision CHOICE -- MSD result based on "terminalType" compare
    {
        master NULL, -- if terminalType is the same then caller
        slave NULL -- is always the master
    },
    profile INTEGER (0..65535),
    ...
}
```

**Figure 9**

Profile 0  
  Mobile Level 2  
  G.723.1 Audio on LCN1  
  MUX table 1={LCN1,RC,UCF}  
Profile 1  
  Mobile Level 2  
  GSM-AMR Audio on LCN1  
  MUX table 1={LCN1,RC,UCF}, 2={LCN2,RC,UCF}  
Profile 2  
  Mobile Level 2  
  G.723.1 Audio on LCN1  
  H.263 QCIF Video on LCN2  
  MUX table 1={LCN1,RC,UCF}, 2={LCN2,RC,UCF}  
Profile 3  
  Mobile Level 2  
  GSM-AMR Audio on LCN1  
  H.263 QCIF Video on LCN2  
  MUX table 1={LCN1,RC,UCF}, 2={LCN2,RC,UCF}  
Profile 4  
  Mobile Level 2  
  GSM-AMR Audio on LCN1  
  MPEG4 QCIF Video on LCN2  
  MUX table 1={LCN1,RC,UCF}, 2={LCN2,RC,UCF}

**Figure 10**



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2003/001662

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>				
Int. Cl. <sup>7</sup> : H04M 3/56, H04L29/06				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>				
Minimum documentation searched (classification system followed by classification symbols)				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT (call, message, protocol, set up, multimedia, 3G, terminal)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	WO 2002/071721 A1 (NOKIA CORPORATION) 12 September 2002 Page 8, line 15 - page 10, line 8, fig. 4	1-6, 23-28		
X	WO 2002/052825 A1 (NOKIA CORPORATION) 4 July 2002 Page 18, line 27-page 21, line 7	1-44		
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex				
<p>* Special categories of cited documents:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 40%; vertical-align: top;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 60%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>			
Date of the actual completion of the international search 6 February 2004		Date of mailing of the international search report 23 FEB 2004		
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  <b>J. LAW</b> Telephone No : (02) 6283 2179		

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

**PCT/AU2003/001662**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
WO	2002071721	EP	1368946
WO	2002052825	EP	1346557
END OF ANNEX			